

CLAIMS

1. A method for manufacturing a semiconductor device, comprising the steps of:

5 forming a first film pattern by discharging a conductive material with a droplet discharge method;

forming a first photosensitive material over the first film pattern;

forming a first mask pattern by irradiating a region where the first film pattern and the first photosensitive material are overlapped with a laser beam and by developing;

10 forming a gate electrode having a desired shape by etching the first film pattern using the first mask pattern as a mask;

forming an insulating film and a semiconductor film over the gate electrode;

forming a second photosensitive material over the semiconductor film;

15 forming a second mask pattern by irradiating the second photosensitive material with a laser beam and by developing;

forming a semiconductor region having a desired shape by etching the semiconductor film using the second mask pattern as a mask; and

forming a source electrode and a drain electrode to be in contact with the semiconductor region.

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2. A method for manufacturing a semiconductor device, comprising the steps of:

forming a first film pattern by discharging a conductive material with a droplet discharge method;

25 discharging or applying a first photosensitive material over the first film pattern;

forming a first mask pattern by irradiating a region where the first film pattern and the first photosensitive material are overlapped with a laser beam and by developing;

30 forming a gate electrode having a desired shape by etching the first film pattern

using a the first mask pattern as a mask;

forming an insulating film and a first semiconductor film over the gate electrode;

forming a protective film over the first semiconductor film;

5 forming a second semiconductor film over the first semiconductor film and the protective film;

forming a second photosensitive material over the second semiconductor film;

forming a second mask pattern by irradiating the second photosensitive material with a laser beam and by developing;

10 forming a semiconductor region having a desired shape by etching the first semiconductor film and the second semiconductor film using the second mask pattern as a mask; and

forming a source electrode and a drain electrode to be in contact with the semiconductor region.

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3. A method for manufacturing a semiconductor device, comprising the steps of:

forming a first film pattern by discharging a conductive material with a droplet discharge method;

20 forming a first photosensitive material over the first film pattern;

forming a first mask pattern by irradiating a region where the first film pattern and the first photosensitive material are overlapped with a laser beam and by developing;

25 forming a source electrode and a drain electrode having a desired shape by etching the first film pattern using the first mask pattern as a mask;

forming a semiconductor film over the source electrode and the drain electrode;

forming a second photosensitive material over the semiconductor film;

forming a second mask pattern by irradiating the second photosensitive material with a laser beam and by developing;

30 forming a semiconductor region having a desired shape by etching the

semiconductor film using the second mask pattern as a mask; and
forming an insulating film and a gate electrode over the semiconductor region.

4. A method for manufacturing a semiconductor device, according to any one
5 of claims 1 to 3, wherein the first photosensitive material and the second photosensitive
material are negative photosensitive resins.

5. A method for manufacturing a semiconductor device, according to any one
of claims 1 to 3, wherein the first photosensitive material and the second photosensitive
10 material are positive photosensitive resins.

6. A method for manufacturing a semiconductor device, according to any one
of claims 1 to 3, wherein one of the first photosensitive material and the second
photosensitive material is a negative photosensitive resin and the other is a positive
15 photosensitive resin.

7. A method for manufacturing a television set, comprising the steps of:
forming a first film pattern by discharging a conductive material with a droplet
discharge method;
20 forming a first photosensitive material over the first film pattern;
forming a first mask pattern by irradiating a region where the first film pattern
and the first photosensitive material are overlapped with a laser beam and by
developing;
forming a gate electrode having a desired shape by etching the first film pattern
25 using the first mask pattern as a mask;
forming an insulating film and a semiconductor film over the gate electrode;
forming a second photosensitive material over the semiconductor film;
forming a second mask pattern by irradiating the second photosensitive
material with a laser beam and by developing;
30 forming a semiconductor region having a desired shape by etching the

semiconductor film using the second mask pattern as a mask;

forming a source electrode and a drain electrode to be in contact with the semiconductor region; and

forming a pixel electrode to be connected to the drain electrode.

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8. A method for manufacturing a television set, comprising the steps of:

forming a first film pattern by discharging a conductive material with a droplet discharge method;

forming a first photosensitive material over the first film pattern;

10 forming a first mask pattern by irradiating a region where the first film pattern and the first photosensitive material are overlapped with a laser beam and by developing;

forming a gate electrode having a desired shape by etching the first film pattern using the first mask pattern as a mask;

15 forming an insulating film and a first semiconductor film over the gate electrode;

forming a protective film over the first semiconductor film;

forming a second semiconductor film over the first semiconductor film and the protective film;

20 forming a second photosensitive material over the second semiconductor film;

forming a second mask pattern by irradiating the second photosensitive material with a laser beam and by developing;

forming a semiconductor region having a desired shape by etching the first semiconductor film and the second semiconductor film using the second mask pattern

25 as a mask;

forming a source electrode and a drain electrode to be in contact with the semiconductor region; and

forming a pixel electrode to be connected to the drain electrode.

9. A method for manufacturing a television set, comprising the steps of:
forming a first film pattern by discharging a conductive material with a droplet discharge method;
forming a first photosensitive material over the first film pattern;
5 forming a first mask pattern by irradiating a region where the first film pattern and the first photosensitive material are overlapped with a laser beam and by developing;
forming a source electrode and a drain electrode having a desired shape by etching the first film pattern using the first mask pattern as a mask;
10 forming a semiconductor film over the source electrode and the drain electrode;
forming a second photosensitive material over the semiconductor film;
forming a second mask pattern by irradiating the second photosensitive material with a laser beam and by developing;
forming a semiconductor region having a desired shape by etching the
15 semiconductor film using the second mask pattern as a mask;
forming an insulating film and a gate electrode over the semiconductor region;
and
forming a pixel electrode to be connected to the drain electrode.
- 20 10. A method for manufacturing a television set, according to any one of claims 7 to 9, wherein the first photosensitive material and the second photosensitive material are negative photosensitive resins.
- 25 11. A method for manufacturing a television set, according to any one of claims 7 to 9, wherein the first photosensitive material and the second photosensitive material are positive photosensitive resins.
- 30 12. A method for manufacturing a television set, according to any one of claims 7 to 9, wherein one of the first photosensitive material and the second photosensitive material is a negative photosensitive resin and the other is a positive photosensitive

resin.

13. A method for manufacturing a semiconductor device, according to any one of claims 7 to 9, wherein the laser beam has any wavelength of from ultraviolet light to
5 infrared light.

14. A method for manufacturing a television set, according to any one of Claims 7 to 9, wherein the television set is a liquid crystal television or an EL television.

10 15. A method for manufacturing a semiconductor device, comprising the steps of:

forming a first film pattern by a droplet discharge method;

forming a photosensitive material over the first film pattern;

forming a mask pattern by irradiating a region where the first film pattern and
15 the photosensitive material are overlapped with a laser beam and by developing; and

forming a second film pattern having a desired shape by etching the first film pattern using the mask pattern as a mask.

16. A method for manufacturing a semiconductor device according to claim 1,
20 further comprising the step of:

forming a third film pattern to be connected to the second film pattern by a droplet discharge method.

17. A method for manufacturing a semiconductor device according to claim 15,
25 wherein the photosensitive material is a negative photosensitive resin.

18. A method for manufacturing a semiconductor device according to claim 15, wherein the photosensitive material is a positive photosensitive resin.

30 19. A method for manufacturing a semiconductor device according to claim 15,

wherein the first film pattern is a conductive film.

20. A method for manufacturing a semiconductor device according to claim 15,
wherein the second film pattern is at least one of a gate electrode, a source electrode, or
5 a drain electrode.

21. A method for manufacturing a semiconductor device according to claim 16,
wherein the third film pattern is a wiring.

10 22. A method for manufacturing a semiconductor device according to claim 15,
wherein the first film pattern is a semiconductor film.

23. A method for manufacturing a semiconductor device according to claim 15,
wherein the second film pattern has a channel formation region, source region, or a
15 drain region.

24. A method for manufacturing a semiconductor device according to claim 15,
wherein the first film pattern is an insulating film.

20 25. A method for manufacturing a semiconductor device according to claim 15,
wherein the second film pattern is an insulating film having an opening.

26. A method for manufacturing a semiconductor device, according to any one
of claims 1, 2, 3, and 15, wherein the laser beam has any wavelength of from ultraviolet
25 light to infrared light.

27. A semiconductor device comprising:
a wiring formed by a droplet discharge method; and
30 an electrode connected to the wiring,

wherein the wiring has a width of 5 μm or less.

28. A semiconductor device comprising:

5 a thin film transistor provided with a gate electrode, a gate insulating film, a semiconductor region, a source electrode, and a drain electrode; and
a gate wiring connected to the gate electrode,
wherein the gate electrode has a width of 5 μm or less and the gate wiring is formed by a droplet discharge method.

10 29. A television set comprising a display device including a wiring formed by a droplet discharge method and an electrode connected to the wiring, wherein the electrode has a width of 5 μm or less.

30. A television set comprising:

15 a display device including a thin film transistor with a gate electrode, a gate insulating film, a semiconductor region, a source electrode, and a drain electrode; and
a gate wiring connected to the gate electrode,
wherein the gate electrode has a width of 5 μm or less and the gate wiring is formed by a droplet discharge method.

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31. A television set according to any one of Claims 27 to 30, wherein the television set is a liquid crystal television or an EL television.